

**Mitigating Stormwater Runoff at Thomas Jefferson Elementary School  
Using Low Impact Development (LID) Practices:  
Installation of Rain Gardens**

**A Proposal for Using a Department of Conservation and Recreation Water  
Quality Improvement Funds Grant**

**Administered by the City of Falls Church,  
Department of Environmental Services**

**April 2009**



*This project received funding from the Virginia Water Quality  
Improvement Fund provided by the Virginia Department of  
Conservation and Recreation (DCR), via DCR Grant 2007-  
WQIF-06.*

*The views expressed herein are those of the author(s) and do not necessarily reflect the view of DCR.*

## Overview

The Department of Environmental Services is proposing the installation of two rain gardens at Thomas Jefferson Elementary School funded by the City's current Water Quality Improvement Fund (WQIF) grant from the Virginia Department of Conservation and Recreation (DCR). All contracts/purchase orders associated with this grant must be completed by the end of our fiscal year in June and all work completed by the end of December 2009.

Among an array of low impact development (LID) practices rain gardens are man-made depressions or 'bioretention areas' designed to improve water quality. The bioretention concept mimics the hydrologic function of the forest habitat where a layer of spongy litter and plants soak up rainfall, while allowing excess water to slowly filter into the soil. In the urban/suburban environment, these bioretention areas intercept runoff from roofs, roads and parking lots, filtering pollutants that otherwise are carried quickly into our local streams. This untreated high velocity runoff scours our streams causing damage to aquatic organisms on its way to the Chesapeake Bay.

The design of the rain garden includes a six inches deep '*ponding area*' at the top of the rain garden that should persist for approximately 48 hours. This *ponding* of water following a rain event provides for evaporation and the settling of particulate materials not filtered by plant materials. Rain gardens are designed so that water is not retained for as long as 72 hours, the time in which mosquitoes can begin to breed.

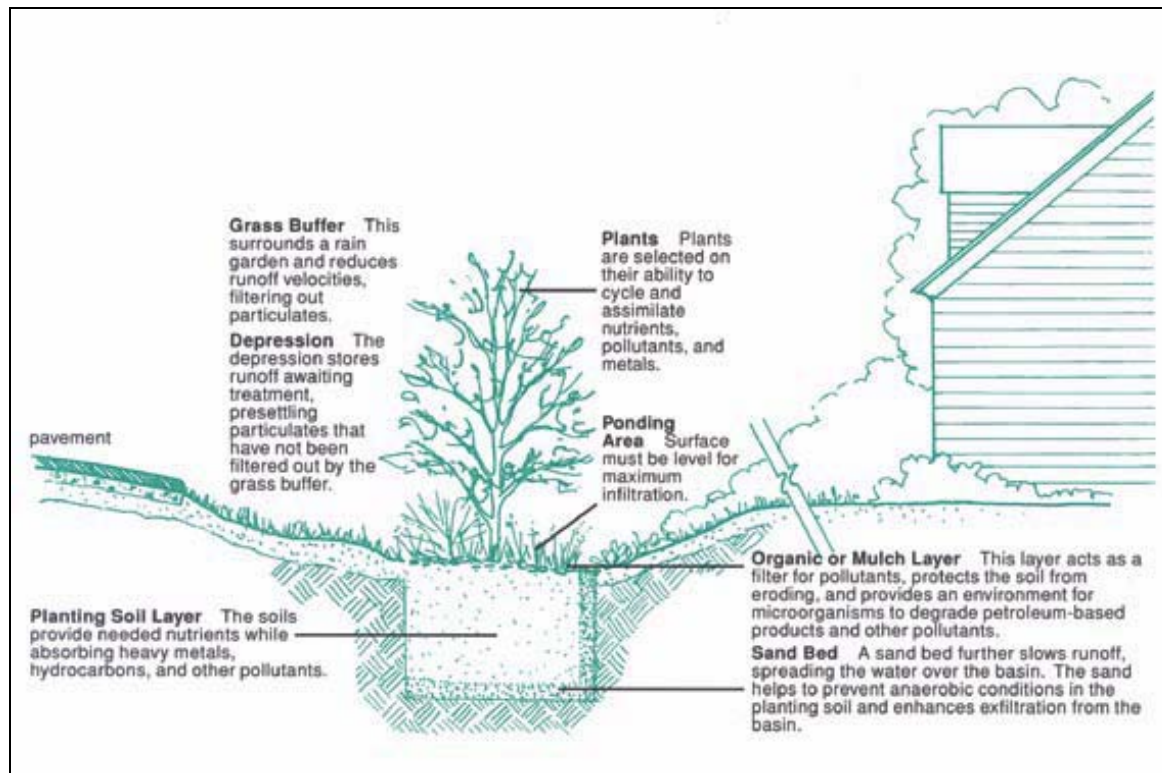
While serving the environment as a stormwater management practice, the rain garden is also a visual amenity in the landscape with plantings that can span the seasons providing a variety of colors and textures. Further, by using native plant materials, the rain garden provides support for beneficial insects, butterflies, birds and other wildlife.



### Example rain garden

(North Center Medical, Saginaw Township, MI; design by *Designscapes, Inc.* – [www.dscapes.com](http://www.dscapes.com))

The design below illustrates the various components of a typical rain garden and explains the role of each in the overall function of a successful system. While the proximity of rooftops and paved surfaces may vary, as will the actual garden design, the concept of the rain garden is consistent with this illustration.



## CROSS SECTION of a RAIN GARDEN

<http://fairfaxcounty.gov/nvswcd/youyourland/landscape.pdf>

## Funding and Timing

This project will be funded through a Water Quality Improvements Fund grant from the Commonwealth of Virginia, Department of Conservation and Recreation and matching funds provided by the City of Falls Church. This grant is being administered by the Department of Environmental Services and all funds from the grant must be expended by December of 2009. The installation and planting of the rain gardens will take place in the fall of 2009. The actual timing of the proposed stormwater management educational sessions and hands-on planting of the rain gardens by the students will be coordinated with the teachers.

## **Proposed Rain Gardens for Thomas Jefferson Elementary School**

The attachment labeled 'Thomas Jefferson Elementary School Proposed Cisterns and Rain Gardens' denotes the two proposed rain gardens.

### **Oak Street Entrance Area Rain Garden – Existing Conditions**

In addition to improving water quality in our watershed, the installation of a rain garden can improve drainage. Such a situation exists at the front walkway of Thomas Jefferson School during or following a rain event, as illustrated in the photographs below and on the following page.



**Runoff from the newest wing rooftop flows across the right front yard and accumulates on the front entrance walkway.**







Both views above illustrate the poor drainage condition and erosion that occur in the upper front yard of the school during rain events. As described in the previously accepted cistern installation proposal, a 1,000 gallon rain barrel is being installed on the downspout between the two windows, to the right of the flagpole, shown in the top photograph above. This cistern will mitigate the amount of runoff from one portion of the roof, lessening the overall accumulation of standing water and erosion. The installation of the proposed rain garden will capture the roof top runoff collected by the three additional downspouts currently

depositing excessive amount of water into this front yard area. The rain garden will also provide an area of plantings where use can be made of the rainwater collected in this 1000 gallon cistern. This relationship between the cistern and the rain garden will illustrate for students the important link between the collected water and the plantings.

### **Front Yard Rain Garden Design Description**

Page 8 includes a photograph of the upper front yard of the school as it currently exists. The illustration below the photograph depicts the rain garden and the new walk way from the same viewpoint. The placement of the rain garden, with dimensions of seven feet in width and ten feet from the curving wall of the newest school wing, will capture the stormwater runoff from the three additional downspouts on the face of this wall. This design is shown in 'Concept Plan View' on page 9. Please note on this design three grass swales convey stormwater from these downspouts to the left, upper side of the rain garden. Water entering the rain garden will be taken up by plants, enter the ground water or, when the soil of the garden reaches 'holding capacity' pass through the rain garden and exit via an underdrain that conveys the water to an existing grass swale near Oak Street. Pedestrians pass over the rain garden on a flagstone walkway supported by a stone base that will be constructed to the same four foot width as the walkway. Three four-inch pipes will convey water under this stone walkway (see the Section-Elevation of the rain garden, page 8).

The placement of the rain garden will require the relocation of the flagpole. The proposed design recommends this new placement five feet from the outmost curve of the newest wing of the building, centered on the brick face (illustrated on page 9). The proposed design indicates a pea gravel surface contained by metal edging around the flagpole adjoining the flagstone walkway used to access this area. Plant materials are proposed between this pea gravel surface and the building. The proposed design also shows the newly placed cistern below the front-most downspout on this building face and a pea gravel path to travel from the cistern to the rain garden. The school's cistern monitors will connect a garden hose to the spigot at the base of the cistern to irrigate the rain garden a few days following rain events.

In this same area the proposed design moves the school's petrified tree stump, relocated to the left side of the flagpole. A circular two-foot wide flagstone walkway with live plant material encircles this feature. We could reuse the plants that currently surround the tree stump for this purpose. A bench overlooks the petrified stump with a view of the rain garden. Stone or flagstone steps lead from the rain garden down the gentle slope to a flagstone surface containing the relocated bench and the new educational signage describing the rain garden and the cistern. The new flagstone walk then joins the existing main concrete entrance walk.

## **Walkway construction and maintenance**

The choice of flagstones as the walkway provides a simplicity of material fitting to the contemporary design of the school structure. These durable stones placed on bluestone dust, rather than in concrete, will lessen the impact on the existing linden trees and will ease the task of repairs should any be heaved by frost over time. Placement on bluestone dust will also allow for adjustments to any portion of the new walk should the main entrance walkway be reconstructed in accordance with the *Schoolyard Master Plan*. The new flagstone walkway from the existing main concrete entrance walk to the base of the steps, to include the area of the relocated bench and educational signs, will be Americans with Disabilities Act (ADA) compliant. The features beyond this point, the flagpole, the cistern and the petrified tree stump will not be ADA accessible.

## **Existing Trees**

The existing young tupelo trees in the front yard will be simple to protect with fencing during the proposed construction. The over-mature linden trees may require some root pruning to allow for the placement of the bluestone dust base of the flagstone walkway. While these trees are already in decline, all precautions will be taken toward their preservation during construction. Heavy plywood will be placed on the ground to reduce compaction damage should equipment may be needed during this construction. Little use of construction equipment is anticipated.

## **Plant Materials – Front Yard Rain Garden and Upper South Side Cisterns**

Plants appropriate for this shady rain garden and the areas surrounding the garden and walkways will be included as a part of the proposed project. This plant list will be developed along with the construction details and will be forwarded on completion. Plants will also be provided to supplement those existing ones near the three newly installed cisterns on the upper south side of the school building. Along with installing new plants in this area where water from the new cisterns can be utilized, we will place a new wood chip path uphill from the cisterns. All of these plants will be a selection of native riparian materials. Maintenance of the gardens will become a part of the landscape maintenance administered by the City's Urban Forestry Division.

## **Educational Signs**

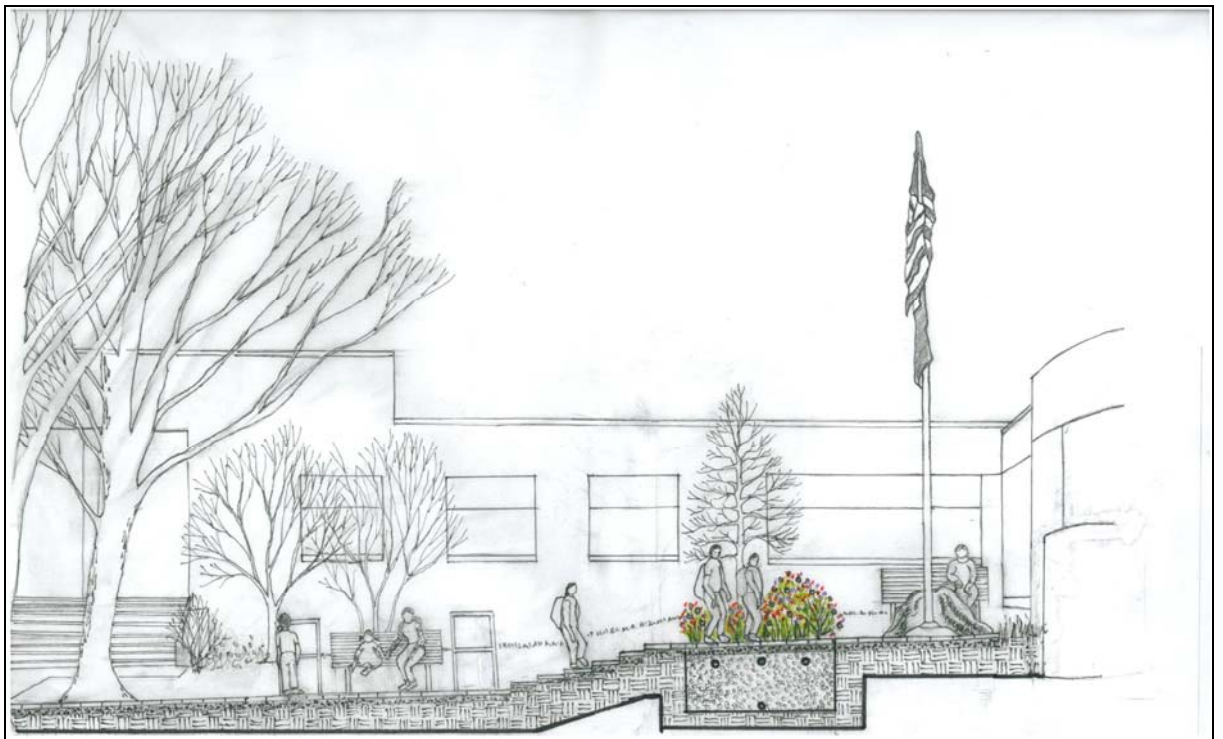
Two educational signs are proposed for this front yard rain garden area. The subject matter of these graphic arts signs will be rain gardens and cisterns. Please refer to the Educational Component of this proposal on page 13 for more detail on the signage proposal. Also see the sample sign 'Pollinator Garden' attached. The School will be given the opportunity to review and approve the contents of these signs prior to their production and installation.



RAIN GARDENS AT THOMAS JEFFERSON ELEMENTARY SCHOOL – APRIL 2009



**Existing Conditions of school's front yard**

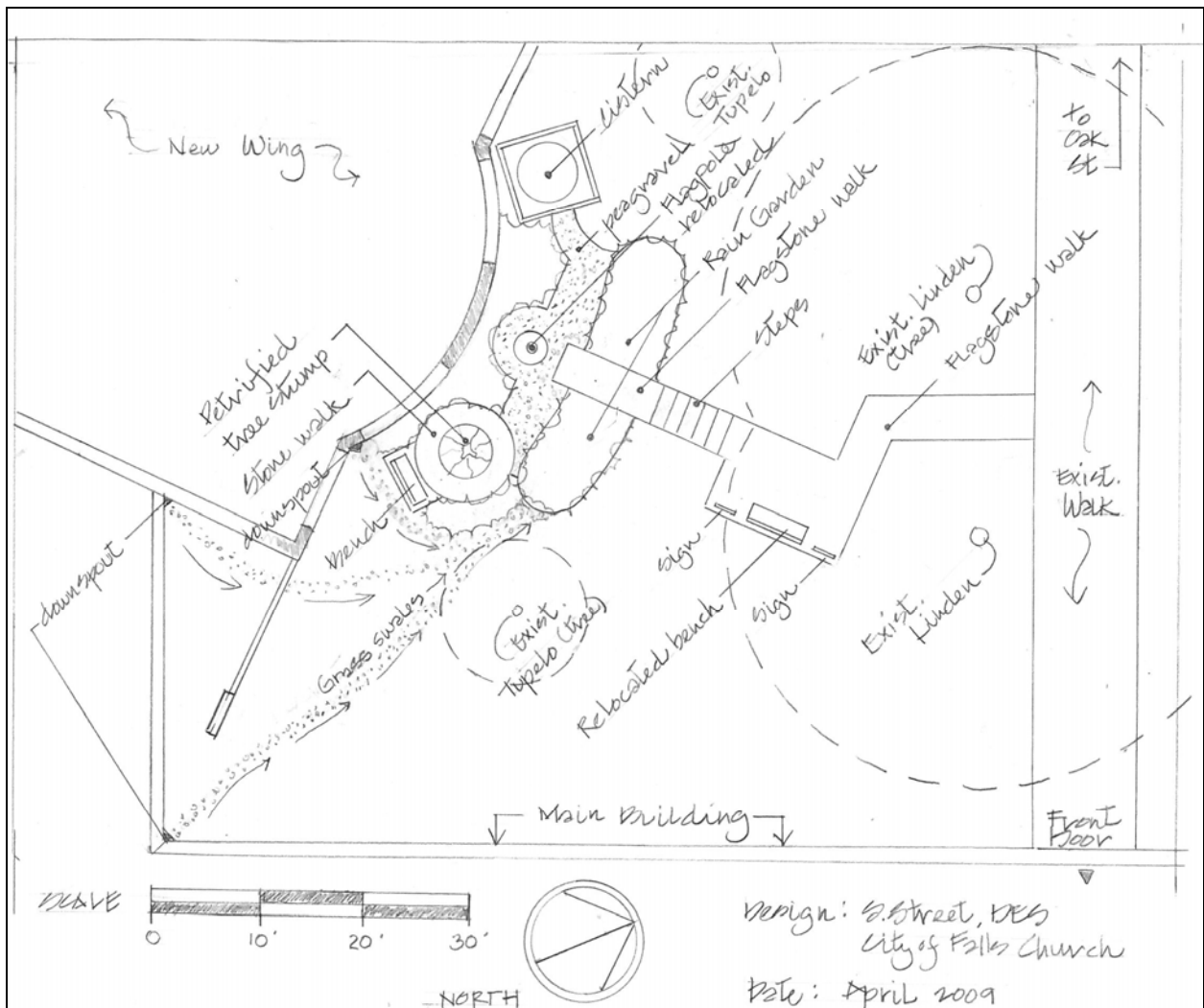


**SECTION-ELEVATION of proposed Rain Garden with new walkway to relocated  
flagpole  
Not to scale**



# RAIN GARDENS AT THOMAS JEFFERSON ELEMENTARY SCHOOL – APRIL 2009

Design & drawing by Shirley Street, DES, City of Falls Church, 2009



**CONCEPT PLAN VIEW of Rain Garden and New Walkway to Flagpole with Educational Signage**

## **Rainwater Garden – Thomas Jefferson School Rear Parking Lot**

The location proposed for the rainwater garden is indicated on the attached plan titled Thomas Jefferson Elementary School Rainwater Garden in Rear Parking Lot.

### **Rainwater Gardens - Concept**

Similar to the rain garden concept, the rainwater garden is a Low Impact Development (LID) bioretention practice, but one that captures runoff from a paved surface directly without the benefit of turf grass filtration. Typically runoff is channeled into a rainwater garden through breaks in a curb where plant materials of the rainwater take up the rainwater or facilitate the waters movement into the improved soil of the garden. This movement through the plants and soil helps filter pollutants that are contained in the runoff from paved surfaces. When the rainwater garden soil reaches 'holding capacity', excess water flows out of lower level breaks in the curb and into the adjoining storm drain.

### **Existing Conditions**



**Runoff from the school's parking lot on Sherrow Ave. currently flows into this storm drain as well as the one on the opposite side of the driveway.**



**Two additional views of the parking lot island, proposed site for the installation of a rainwater garden.**





## Design Description

Rainwater runoff from the parking lot will flow from both sides of the driveway, as well as from the parking lot through breaks that will be created in the upper section of curb along the drive. Like the rain garden in the front yard a new soil mix, designed for maximum water holding capacity and plant nutrients, will replace the existing soil in the upper portion of the new garden area. The sunny exposure of this rainwater garden will allow for the use of colorful, sun-tolerant native plant materials. As described in the rainwater garden concept above, excess water will be allowed to pass directly into the adjacent storm drain seen in the second photograph on page 11. See the sample rainwater garden below on this page.

## Educational Signage

As discussed in the Educational Component below and on the related attachments to this proposal, one sign is proposed for this rainwater garden to graphically depict its function and environmental benefits.

## Existing Trees

The one tree that will need to be removed for this rainwater garden installation is the red oak seen in the photographs on the previous pages. This tree is in 'fair to poor' condition. This tree has exhibited very poor annual growth from the time it was planted over twenty years ago, particularly as compared to the nearby pin oaks planted at the same time. Symptoms of secondary disease also appear on this tree. The proposal for this rainwater garden will include new native plants that will provide a variety of environmental benefits. If the school so chose the City could also offer to plant a new red oak elsewhere on the property that will flourish as the existing tree never will. A copy of this proposal is being provided to the City Arborist.



**Example of a rainwater garden (before and after installation)**

## **Educational Component**

While the staff of DES is pleased with our proposed designs for the two rain gardens described above, we are most excited about offering an educational component to these projects. Please see the attachment from Lands and Waters, a non-profit organization, describing the proposed educational sessions that will include hands-on activities for the 4<sup>th</sup> grade students in the planting of the rain gardens. Also attached is description of the background of Lands and Waters which includes the organization's involvement in the Fairfax County school system. The website for Lands and Waters can be found at [www.forlandsandwaters.org](http://www.forlandsandwaters.org). Jeanette Stewart of Lands and Waters has agreed to meet with the teachers and other school staff to discuss this proposal. As noted above all costs listed on the Lands and Waters proposal will be born by the City's matching funds.

Please contact Shirley Street, DES, at 703-248-5101 or [sstreet@fallschurchva.gov](mailto:sstreet@fallschurchva.gov) to set up this meeting or with any questions on this proposal.

Under our budget requirements, we must have all procurements related to these projects completed by the end of June. Procurement procedures toward this end may require several weeks. We therefore request your approval or proposed changes to our proposal by May 5 that we might move ahead with purchase orders and contracts involved with these projects

The City of Falls Church is committed to the letter and spirit of the Americans with Disability Act. This document will be made available in alternate format upon request. Call 703-248-5105, (TTY 711).